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EDITORIAL.

Sago. The Malayan sago industry, centred in Singapore, is mainly an import and export business, but there is also a flourishing manufacturing industry, the raw material being obtained mainly from Sumatra and the State of Johore. Imports of sago are about 60,000 tons annually, but we often wonder how far the figures are accurate, for sago is frequently confused with tapioca, the finished products being very similar in appearance. A City Analyst in England recently reported that of six samples which he purchased, five were found to consist of tapioca and one of sago. He added that there can scarcely be any real prejudice against the sale of tapioca for sago for most purchasers asking for the latter really want tapioca, which is a whiter product.

The sago industry is of interest in Malaya because this valuable product is obtained from a palm which grows without special cultivation, in swampy places unsuited to the cultivation of other crops, while the manufacturing process does not involve any great capital outlay.

Some years ago an article on sago was published in a contemporary in which the writer, who claimed practical experience with the crop, advocated planting on estates where ravines and swamps existed and claimed that it would prove a sound investment. There is evidence to support this contention, especially as the palm not only yields a valuable food product, but its leaves provide better *ataps* (thatching material) than do the leaves of any other Malayan palm used for this purpose. Moreover, in the Federated Malay States, a rebate of rent is at present allowed, under certain conditions, on land planted with sago palms.

As a foodstuff, and therefore as a possible source of augmenting the Malayan food resources, the value of sago should not be overlooked. Burkill in his "Dictionary of Economic Products of the Malay Peninsula" states:—"Sago is one of the first substitutes for rice. Thus before the rice-harvest, when supplies of grain are low, needy folk, such as live particularly in eastern Malaysia, fall back, not of preference, but out of necessity, on preparing for themselves a crude form of sago.....". A valuable by-product of the sago industry is the refuse, which is highly prized and readily sold as a pig food. The composition of this refuse varies considerably, but the average composition is at least equal to that of tapioca refuse, which is also used for the same purpose.

An article on "The Sago Industry in Malaya" by Messrs. J. Fairweather and S. T. Yap, which is included in this number, again draws attention to the claims of this crop for more serious attention as a means of increasing local food supplies.

Tobacco Experiments. Experiments on the cultivation, manuring and curing of tobacco have been conducted at several centres by the Department of Agriculture for some years. An addition to our knowledge of this crop is provided by the account of experiments at the Central Experiment Station, Serdang, which is included in this number.

The conclusion is reached that the climate of Malaya is unsuitable for the production of a high-grade cigarette tobacco.

Tobacco planting in Malaya is entirely in the hands of Asiatics, who produce a leaf fit only for the manufacture of the cheap cheroots smoked by the labouring classes. The industry flourishes in several centres, and serves a particularly useful purpose in providing a readily saleable rotation crop for market gardeners.

In view of the failure to produce a light-coloured bright tobacco suitable for cigarette manufacture, future work of the Department will be directed to investigations on the possibilities of introducing the heavier types of tobacco, suitable particularly for the manufacture of cheroots. In addition, the investigations will have as their object the curing of such heavy types by the flue barn method which, if successful and adopted by growers, should lead to a marked improvement in the quality of the cheroots.

Original Articles.

TOBACCO EXPERIMENTS AT THE CENTRAL EXPERIMENT STATION, SERDANG, 1933-1935

BY
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Introductory.

The cultivation of tobacco in Malaya is almost exclusively in the hands of Asiatic growers, who usually cultivate small areas as a rotation crop; sometimes the crop is planted on newly-cleared land and in that event two or three crops are taken off the same small areas while permanent crops interplanted with tobacco are becoming established.

The crop has in the past failed to attract the European planter, probably owing to the grades grown being only of moderate quality and unsuitable for export, so that he is at the mercy of a purely local market controlled only by strictly local supply and demand. The market price in any particular locality in Malaya thus varies over a wide range at different times and has a considerable influence on the acreage planted in any planting season.

The crop is usually sown in February/March to ripen in June to August, but advantage of the short dry season in January and February for maturing and harvesting is sometimes utilized by sowing in October/November.

The local growers have the protection of duties on imported tobacco, whilst no excise duties are levied on locally-grown tobacco, but there are restrictions on the movement of tobacco in different parts of the Peninsula.

About 5,000 acres of tobacco are reaped annually in Malaya, which is a considerable increase over figures for 1931. The locally-grown leaf competes with imported unmanufactured leaf, on which the duty is much less than on manufactured tobacco—a condition which has encouraged the development of a Malayan cheroot-manufacturing industry.

Endeavours to produce tobacco suitable for manufacture into cigarettes were inaugurated in 1932 with the Virginian varieties Joyner and Hickory Prior.

Experiments at Serdang.

During the past five years extensive experiments on tobacco have been carried out at Serdang.

In 1932, a small flue barn was erected for curing trials with the true cigarette types and other varieties that might prove more suited to the production of high-grade leaf in the tropical climate of Malaya.

Articles on cultivation, experiments, diseases and insect pests, have been published in the *Malayan Agricultural Journal* from time to time. The present article gives the results of manurial experiments and curing trials at Serdang during the past four years with revised and additional information to that already published.

Experiments in 1933.

Experiments conducted in 1933 were of an exploratory character. They indicated the following facts:—

(1) Sowing in nursery beds should be completed in February to allow the plants to be transplanted early in April to mature in July, thus providing a liberal rainfall during the growing period and the driest months of the year for ripening and harvesting.

(2) They emphasised that adequate dressings of fertilizers are necessary to obtain reasonable yields.

Manurial Experiment in 1934.

During 1934, a manurial experiment was laid down, using the light-leaf cigarette varieties—Joyner and Hickory Prior—the objective being the curing of bright yellow leaf suitable for cigarettes.

The experiment was conducted on half an acre of slightly undulating land in Block 40 on the Raub red series of laterite soil having a crumb texture.

A leguminous cover crop mostly of *Calopogonium mucunoides* was turned into the surface soil about four weeks before planting, after which the land was marked out in plots and made into low ridges 3 feet apart.

The half-acre was divided into 16 sub-plots, each 1/32nd of an acre and randomized in a four-way Latin Square.

The manurial treatments were as follows:—

Plots.	Treatment.	per acre.
A —	Cattle manure	... 10 tons
B —	Cattle manure	... 5 ,,
	Basic slag	... 2 cwt.
C —	Basic slag	... 3 ,,
	Sulphate of potash	... 1 ,,
D —	Calcium cyanamide	... 1 ,,
	Basic slag	... 3 ,,
	Sulphate of potash	... 1 ,,

A planting distance of 3 feet x 3 feet was adopted, but subsequent growth indicated that 3 feet x 2 feet would have been adequate.

Table I.

Actual Yields of Green Leaf per Sub-Plot of 1/32nd acre.

(in lbs.)

Treatment.	Sub-Plot.				Total.	Mean.
	1	2	3	4		
A. ...	70	82	109	131	392	98
B. ...	77	100	134	124	435	109
C. ...	123	141	147	138	549	137
D. ...	115	136	168	168	587	147

The conversion figure for cured tobacco was found in these trials to be 14 per cent. of the green leaf.

A statistical analysis of variation was made on the weight of green leaves harvested and showed that any difference greater than 16.32 lbs. in mean yields was significant.

Discussion of Results.

Treatment C (fertilizers supplying phosphates and potash) is significantly better than A (cattle manure 10 tons per acre) and B (cattle manure 5 tons plus basic slag 2 cwts. per acre). Treatment D (complete dressing of nitrogen, phosphates and potash) was significantly better than Treatments A and B.

The Flue-curing Process for Bright Yellow Tobacco.

Since much comment is made in this article on flue-curing, a brief outline of the process is given.

The operation is carried out in a specially constructed barn usually 16 feet x 16 feet x 16 feet, having inside racks on which poles carrying tobacco leaves or plants are hung. One or two furnaces with flue pipes passing through the base of the barn are an integral part, and facilities for the control of top and bottom ventilation are incorporated.

The standard process is here given, but variations are necessary according to climate, humidity, and the percentage of moisture in the leaf.

Careful treatment is essential by the application of heat, which controls the relative humidity of the air within the barn.

This method comprises three periods of treatment:—

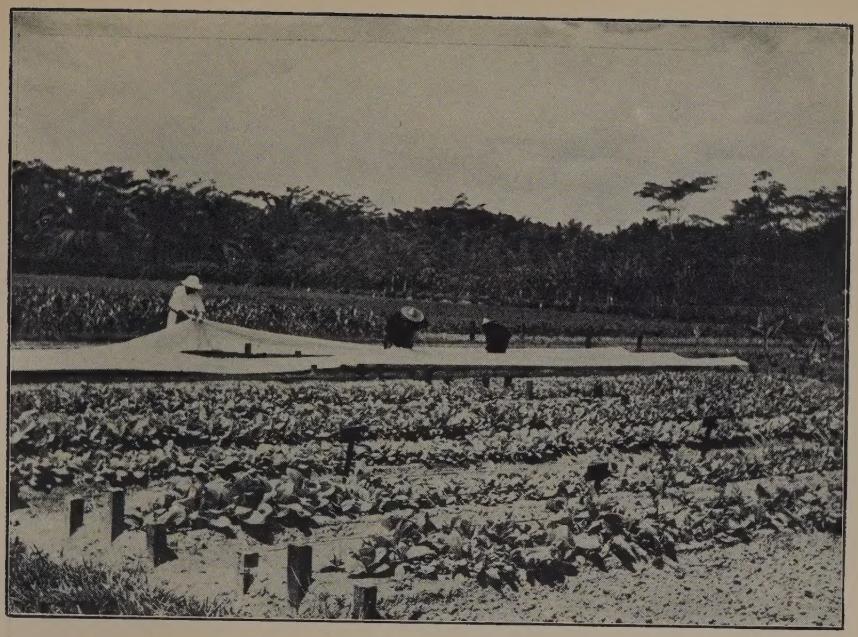
A. Yellowing the leaf.
B. Fixing the colour.
C. Drying the leaf and mid-rib.

Yellowing the leaf takes from 40 to 60 hours and commences with a temperature of 85° to 90°F., so that in Malaya very small fires are necessary during the first day, but greater heat is required towards evening. The temperature is gradually raised to 110°F. while the yellowing of the leaf takes place. As soon as the leaf is definitely yellowing, the top ventilators are opened a little and, as the yellowing proceeds, the openings are increased to permit the moisture to escape. When the leaf is almost yellow the bottom ventilators are opened slightly, and, as the temperature is raised to 120°F., all top and bottom ventilators are opened for a period of 22 to 30 hours, the object at this stage being to fix the colour. The temperature of the barn is again raised gradually from 120° to 130°F., *i.e.* approximately one degree every 2 hours, during which time both top and bottom ventilators remain open. At the end of this period the yellow colour should be fixed and the drying of the leaf commenced. The temperature is further raised 5°F. during 8 to 15 hours when the leaf should be dry. The temperature may then be raised, at a slightly quicker rate, to 160°F. This part of the process occupies about 18 hours, after which period the mid-rib of the leaves may be snapped clean. The drying is continued for a longer period if necessary until this degree of dryness is obtained, after which the barn is opened and cooled. The tobacco is then permitted to absorb sufficient moisture so that it can be handled, when it is removed and stacked to mature and to develop its characteristic aroma.

Curing Experiments in 1934.

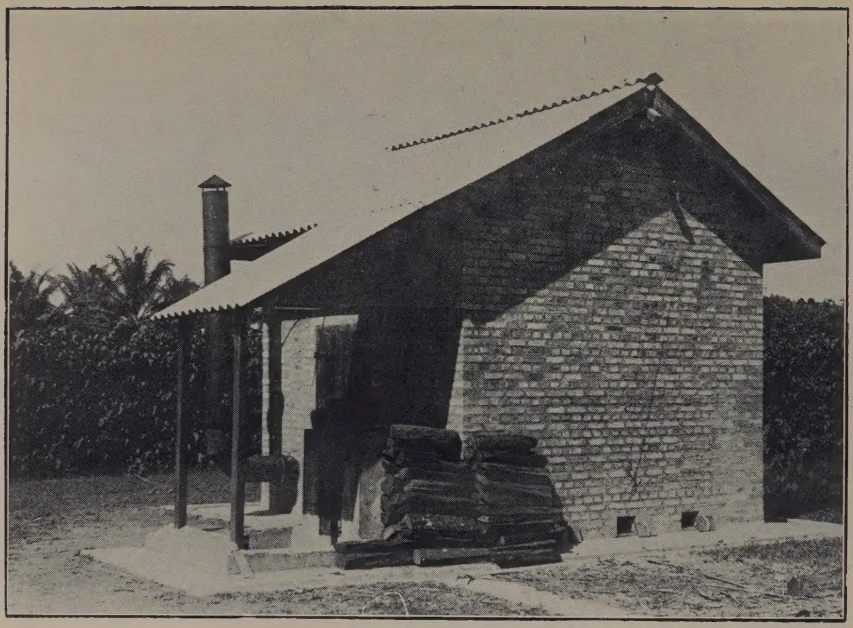
The experimental barn at Serdang is 12 feet by 12 feet and 10 feet to the eaves, having four tiers of racks situated from 6 feet above the floor to the eaves. It has a capacity of 9,500 leaves if they are strung on poles in pairs, the weight of this quantity of green leaf being approximately 750 lbs., which dries to 100 lbs. of cured leaf. The barn therefore requires to be filled five times to cure the leaf harvested from one acre, and allowing a five-day curing process, with an additional day for emptying and refilling, a period of one month is necessary to cure the crop from one acre. Consequently planting at intervals or the use of varieties that have different maturation periods is necessary if a larger crop is to be flue-cured with a barn of these dimensions.

Although great care was devoted to the curing of each barn of leaf, and the recommended schedule of temperatures with the control of humidity was followed as far as was practicable under the conditions prevailing, bright yellow leaf was not obtained. It was possible to "yellow" a high percentage of the leaf in a moisture-saturated atmosphere, but as soon as the barn was ventilated and the temperature raised, the leaf became brown; despite this darkening of the leaf a



Tobacco Nurseries at Serdang.

Protection of Newly-planted Seedlings by
(*a*) Large Jungle Leaves, and
(*b*) Palm Leaves.



THE EXPERIMENTAL FLUE BARN AT SERDANG.

TOBACCO EXPERIMENT PLOTS AT SERDANG.

fairly attractive grade was produced, which commanded a ready sale for use in the manufacture of local cheroots.

Manurial Experiments in 1935.

The manurial trials commenced in 1934 continued in the following year. It was considered that since satisfactory yields had been obtained in 1934 from Plots D, which received a complete dressing of chemical fertilizers, this application should be utilized as a standard dressing on control plots. Owing to the earlier failures to flue-cure leaf to a bright yellow, the experiment was designed to explore the effect of dressings having a phosphate or potassium bias on two of the series of plots (C and D), on which no nitrogen was applied, to ascertain whether a leaf that would cure to the desired colour could be produced by reducing its nitrogen content and increasing the phosphates or potash.

To the fourth series of plots (B) a dressing of the same order as the control was applied with a 50 per cent. increase in quantities. The details of the treatments were as follows:—

Plots.	Treatment	cwts. per acre.
A.	Calcium cyanamide ...	1
	Basic slag ...	3
	Sulphate of potash ...	1
B.	Calcium cyanamide ...	1½
	Basic slag ...	4½
	Sulphate of potash ...	1½
C.	Basic slag ...	6
	Sulphate of potash ...	1
D.	Basic slag ...	3
	Sulphate of potash ...	2

Cattle manure dressings were not included in these experiments as it was desired to produce leaf, at least on some of the plots, without an excess of nitrogen. Tobacco grown with an abundance of available nitrogen in the soil produces a heavy fleshy leaf which is difficult to cure to a bright yellow, even in climates suited to the growth and curing of this type of leaf. Furthermore, as cattle manure is not usually available it is not considered advisable to recommend it for this crop if it can be economically replaced by chemical fertilizers.

The trials were carried out in two series of plots, one of which (Yellow Prior) was arranged in the form of a Latin Square on one acre, the plots being 1/16th of an acre and the treatments replicated four times and randomized. The second series was planted with Hickory Prior on two sets of eight plots, each 1/16th of an acre; the treatments were also replicated four times and randomized. Planting was carried out on low ridges 3 feet apart, the distance between plants along the ridges being 2 feet, which allows for 7,260 plants per acre.

The yields of green leaves were as follows:—

Table II.

Yields of Green Leaves per Sub-Plot of 1/16th acre.

(in lbs.)

(a) Hickory Prior

Treatment.	Sub-Plot.				Total.	Mean.
	1	2	3	4		
A. ...	273	409	302	379	1,462	365.56
B. ...	401	452	457	406	1,715	428.75
C. ...	355	356	428	478	1,617	404.25
D. ...	304	364	312	354	1,334	333.50
Totals ...	1,432	1,581	1,499	1,616	6,128	—
Means ...	358	395.35	374.75	404	—	383.01 General Mean.

(b) Yellow Prior.

Treatment.	Sub-Plot.				Total.	Mean.
	1	2	3	4		
A. ...	220	157	228	228	832	208.06
B. ...	186	278	252	268	983	245.52
C. ...	251	182	279	324	1,036	259.00
D. ...	148	207	262	306	922	230.50
Totals ...	804	824	1,020	1,126	3,773	—
Means ...	201	205.87	254.87	281.44	—	235.81 General Mean.

Statistical analysis of variance was carried out on Table II on weight of green leaves harvested. It should be noted that a probable sacrifice in yield was anticipated from land under Treatments C & D to which no nitrogen was added. For this reason the interpretation of the actual results is particularly interesting.

These analyses showed that Hickory Prior yields required a variation of 70.14 lbs. and Yellow Prior 48.35 lbs. between any pair of plot yields for significance.

Discussion of Results.

Hickory Prior was the heavier yielder of the two despite the assumption that the soil conditions were better on the plots in which Yellow Prior was planted.

The mean loss of weight and the corresponding percentage of cured to green leaf was as follows:—

	Loss of Weight per cent.	Cured Leaf per cent.
Hickory Prior ...	89.43	10.57
Yellow Prior ...	87.92	12.08

These figures show that the percentage of dry matter in the leaf was much lower than the average recorded in other countries, although harvesting was not undertaken until the leaves had developed the characteristic ripe yellowish-green colour; basal leaves, which are the earliest to ripen, were plucked first.

The 50 per cent. heavier application of manures on Plots B, over the standard dressing as applied to control plots (A), did not produce significant increases.

Nitrogen did not in general produce significant increases when comparisons are made with Plot A yields (standard complete dressing, controls) and C and D on which nitrogen was absent. This may be due to the turning under of a growth of cover crops and grasses about a month before the tobacco was planted, which evidently provided adequate supplies of available nitrogen.

Hickory Prior.—Treatment B (heavy complete dressing) is significantly better than D (no nitrogen, but a double dressing of potash).

Yellow Prior.—Treatment C (no nitrogen, but a double dressing of phosphate) was significantly better than (A) (standard complete dressing) despite the omission of nitrogen, indicating that phosphate is the important ingredient for tobacco growing; this is confirmed by Queensland authorities (2).

Owing to the general acidity of Malayan soils these manurial trials were carried out with basic manures. Experiments in the United States of America have shown that the optimum pH value in soils for tobacco growing ranges between 5 and 5.25, but the crop is tolerant of acid conditions to a pH value of under 4.

Future manurial trials in Malaya should include acid mixtures compounded from sulphate of ammonia, superphosphate, and sulphate of potash, since such fertilizers will have practically no effect on the pH value of the soil, and acid mixtures have been found in other countries to give the best results.

Curing.

In previous years, the curing of bright yellow leaf in the barn was found to be practically impossible, and less than 2 per cent. of the leaf in any trial was ever cured to a yellowish colour, which could not be classed as "bright". This small percentage was considered to be too dark for standard Virginian cigarettes. The leaf was suitable for the manufacture of cheroots, and selected leaf was used extensively for outside wrappers.

Curing trials up to 1934 had shown that difficulties occurred in fixing the yellow colour, and it was thought that more rapid ventilation, with the consequent quicker change from a moist to a dry atmosphere within the barn, might facilitate the fixing of the desired colour. Before the 1935 crop was ready for harvesting the top and bottom ventilation systems were structurally enlarged to give a more rapid movement of air through the barn. These alterations, as recorded later, gave no greater percentage of bright leaf.

A thermograph, in addition to a wet and dry bulb thermometer, was installed in the barn adjacent to a window in the door so that readings could be taken without opening the door. The temperature and time chart, with the humidity of the air to the stage of the process when the fixing of the yellow was desired, was controlled according to the schedule as described earlier in this article, but it was found that an extension of time was necessary for yellowing of the leaf.

Despite the greatest care taken, as soon as the ventilation of the barn was commenced after yellowing, and the temperature raised to fix the colour, the leaf turned to a yellowish-brown colour of varying density. It is conjectured that this browning is due to a partial decomposition of the leaf tissues, which lowers its smoking qualities.

Variations of the scale of temperatures and humidity were tried, particularly at the stage of the process when the "yellow" is fixed and, for instance, a more rapid rise in temperature at the fixing stage gave a high percentage of green cured leaf with a proportion of dirty-brown colour.

The tobacco harvested from plots that received double dressings of phosphate or potash and no nitrogen gave no greater percentage of yellow cured leaf.

Attempts to flue-cure leaves which had yellowed on the plants before harvesting were made, using cigarette types and White Burley. These attempts were unsuccessful, as in each case the final colour of the leaf was brown. Endeavours were also made to induce yellowing by the use of 1 and 2 per cent. concentrations of ethylene gas in atmospheric air in a closed glass chamber. The leaves yellowed, but unevenly, and by the time the whole of each leaf had turned yellow the edges and tips had become brown.

Leaves were kept under observation in the ethylene chamber for periods of 3 to 5 days and some were removed to the flue barn when only partially yellowed and subjected to the higher temperatures in the flue barn with a low relative humidity to fix the colour, but in all such attempts the cured leaves became brown.* The nearest approach with gas treatment to the manufacture of a bright yellow was obtained by air-drying under shade subsequent to the gas treatment; even these leaves could not be classed as "bright".

Tobacco grown on land to which lime had been applied in an endeavour to reduce soil acidity and supply calcium salts to the leaves, gave no better results in the flue barn.

* It is standard practice to raise temperatures to fix the "yellow" before all the tissue of the leaves has turned yellow.

Trials were also made of partially withering and yellowing of leaves by hanging them in an open shed for 24 to 48 hours before placing them in the barn. This method involved a more rapid rise of the temperature in the barn than is recommended under the ordinary curing process. The cured tobacco was very similar to that produced by other variations from, and by, the standard scheduled process.

The best yellow tobacco made on the Station was obtained by sun-curing individual leaves spread out between two fine bamboo open trellis frames tied together, a method of curing practised by local Chinese growers. The bleaching action of the sun probably had the greatest influence on the results. The cost of construction of frames and the labour required in transporting them to and from sheds night and morning, and in rainy weather, makes the process very expensive when paid labour is used, but it is practicable and is the common custom of Chinese cultivators with the aid of their families.

The atmospheric humidity prevailing in Malaya, particularly between the hours of midnight and 7 a.m., when saturation point is approached, provides conditions under which it is extremely difficult to cure bright tobacco.

The heavy rainfall and high humidity produce a leaf having an exceptionally high moisture content, which is unfit for the production of bright leaf. The percentage of cured to green leaf has varied between 10.5 and 14 per cent., which shows a very wide variation from figures published in other countries. Indian records (1) give rates of dry to wet leaf at 20 per cent. It is probable that the loss of moisture from leaves as they ripen and before they are harvested is far greater in dry than in wet climates.

The quality of leaf grown on light soils at Serdang, and during 1935 on certain plots with a minimum of nitrogen, has always been thin and light-bodied, lacking in aroma and smoking qualities. Under the heavy rainfall and high humidity conditions prevailing the production of such leaf must be expected.

Despite the failure to cure bright yellow leaf in these trials, the grades produced have been much brighter than it is possible to cure by air-drying or the use of braziers in open sheds. The control of conditions that can be exercised in a flue-barn, particularly in such a wet climate as Malaya, makes it a safer crop to grow and provides conditions for curing which enable the grower to turn out, even during adverse weather conditions, a fair grade of leaf suitable for the manufacture of cheroots and possibly the darker type cigarettes for the local market.

Comparisons of the rainfall, humidity, and atmospheric temperature of North Carolina, United States, where the highest quality virginian tobacco is produced, and of Serdang may be summarized as follows.

The rainfall at Serdang is more than two and a half times greater than that of North Carolina. In spite of the much higher rainfall, the relative humidity is not considerably higher at Serdang than occurs in North Carolina during the growing period, but when comparisons are made with the mid-day records at North Carolina and 1 p.m. records at Serdang during August (North Carolina) and July (Serdang), *i.e.* the harvesting months, a 10 per cent. higher humidity at Serdang is revealed, despite the fact that Serdang temperatures are higher and records are taken daily

one hour later when the air temperature would normally rise a little, rendering the relative humidity lower. The minimum daily temperatures at Serdang are 20°F. higher than those of North Carolina.

A perusal of articles on the curing of tobacco in the most suitable districts in America shows that yellow tobacco can be cured in almost any type of barn, [2] and ventilation need not be strictly under control. It is contended that climate and suitable light soil conditions are far more important than the type of barn. It must, however, be recorded that the highest grades are cured in barns under fully-controlled conditions of temperature and humidity.

It is reported in Kenya that yellow tobacco can be flue-cured during certain seasons of the year when the prevailing winds are dry and from the west, but as soon as the North-East Monsoon breaks, with its resultant high humidity, the production of yellow leaf becomes impracticable.

In Ceylon, B. F. Scherffius reported in 1917 that flue-cured tobacco could not be produced under the soil and climatic conditions of Jaffna [3].

The cultivation of yellow tobacco in South India is carried out only in districts where the rainfall is less than 40 inches per annum [4].

Investigations on tobacco curing at Serdang are proceeding on the following lines:—

(1) The production of the darker and heavier types of leaf by:

(a) flue-curing,

(b) fire-drying in sheds by the use of braziers,

(c) sun-curing of whole plants and/or single leaves.

(2) Since the Burley types of tobacco and some Indian varieties produce a leaf which is lighter-coloured than most of the commoner tropical varieties and which "yellow" naturally on the plants, endeavours are being made to cure a light "mahagony" grade leaf for cigars, cheroots, pipe smoking and the cheap cigarette suitable for local manufacture.

Summary.

Manuring.—

(1) The following mixture of fertilizers per acre has given satisfactory yields: calcium cyanamide 1 cwt., basic slag 3 cwts., and sulphate of potash 1 cwt.

(2) A 50 per cent. increase in quantities did not produce significant enhanced yields.

(3) Plots receiving additional phosphates indicated that a higher proportion of phosphates to nitrogen and potash would probably provide a better balanced mixture for the crop in Malaya.

(4) The experiments were designed to grow yellow cigarette tobacco, and apparently adequate supplies of available nitrogen were present in the soil. For the production of fuller-bodied leaf, however, heavier dressings than the above may be necessary, particularly on land being regularly cropped, since the organic matter, with its nitrogen content, is rapidly lost owing to intense bacterial activity in soils exposed to the sun.

Curing.—

(1) The heavy rainfall of Malaya produces a leaf having an exceptionally high moisture, and low dry-matter, content, which is unsuitable for curing as bright yellow tobacco, but the use of flue barns is recommended for better control of the curing process, which will enable growers to manufacture brighter grades than is possible with air-drying.

(2) The high atmospheric humidity makes it extremely difficult to cure bright yellow tobacco.

(3) Investigations are proceeding on the production by flue-curing and brazier-curing in open barns, using the lighter Indian and Burley types, of leaf for cheroots, pipe-tobacco and possibly the cheap locally-made cigarettes.

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THE SAGO INDUSTRY IN MALAYA

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There are two important species of sago palm, *Metroxylon sagus* Rottb., the smooth-sheathed variety, and *M. Rumphii* Mart., the spiny sheathed variety, present in the Malay Peninsula, both in a cultivated and in a half wild state. The former, which is a taller palm, is more abundant in western Malaya, the latter in eastern Malaya.

The palms grow to a moderate height, *M. sagus* often attaining 40 feet, and throw up stems in succession from rhizomes, each stem in turn flowering, fruiting, and dying after a life of about fifteen years. They grow best on a swampy soil, and are propagated by means of suckers, but may also be grown from seed, which is a much less expensive method and is in other ways more satisfactory. Suckers are, as a rule expensive, and unless the removal from the parent tree has been carried out with the greatest care, their chances of survival are not great. In Malaya, the sago palm is not grown as a plantation crop, but is to be found growing along river banks and in low-lying areas in the vicinity of rivers. The palms are usually harvested when they are about twelve years old, and the trunks about 12 to 18 inches in diameter. They are cut into pieces 4 feet in length and floated in the river to the factories where the raw sago is prepared.

On arrival at the factory the cortex of each log is stripped off, an axe being employed for this purpose. The log is then placed on a bench and rasped by means of a board, studded with nails, which is operated by two men.

The grated material, which in appearance resembles saw-dust, may then be despatched by boat to the larger Singapore factories. In most of the small factories, however, starch or crude flour is extracted from the logs, and despatched in that form to the factories at Singapore for conversion into "pearl" sago or flour.

Singapore factories depend mainly for their supplies of raw sago on the Netherlands Indies, the chief centres of production being Bintulu, Sibu, Beletong, Bengkalis, Koedap, Sambas, Simbang, Pontianak, and Kuching (Sarawak). A certain quantity is received from Batu Pahat in the Unfederated State of Johore. There are seven factories operating in the latter area, situated at the junction of the Sungei Simpang Kanan and Parit Bilal, where, with water close at hand, no difficulty is experienced as regards transport. It is this cheap form of transport that enables the industry to survive.

SAGO PALMS. (*Metroxylon sagus* Rottb.)

UNLOADING RAW SAGO FROM JUNKS.

SUN-DRYING PLATFORMS.
Note Kajangs for use in case of rain.

The areas under sago palm in Johore are estimated to total 1,814 acres.

The sago industry of the Batu Pahat District was established some forty years ago by Malays. At that time, the Chinese were engaged in the more profitable trade in pepper and gambier, but they eventually became interested in the sago industry, and subsequently established themselves to the total exclusion of the Malays.

Yields.

The yield of crude flour or starch varies with the size of the palm, and ranges between 250 and 650 lbs. per palm, the yield of sago flour approximating to 58 per cent. of the crude starch.

Manufacture of Sago in Singapore Factories.

All factories in Singapore are advantageously situated, being located along the Kallang River, giving easy access to boats, and facilitating disposal of refuse which is either dumped at sea or sold as pig food.

Storage.—Consignments of raw sago as they arrive at the factory are placed in a spacious store-room and steps taken to ensure that each will be treated in the order of its arrival, thus guarding against deterioration or excessive fermentation setting in. Crude sago contains very fermentable substances, and within a few days of extraction and delivery at the factory the fermentation commences, and a very objectionable smell is given off.

Extraction of Starch.—The raw sago is transferred from the store-room to wooden tubs measuring 3 feet in height by 6 feet in diameter, the sides converging slightly towards the top. A piece of rope is tied across the mouth of the tub, which has been previously filled with fresh water; across the rope a piece of unbleached calico is placed covering one half of the mouth of the tub. The raw sago from which the starch is to be extracted is placed is this cloth and washed until as much of the starch as possible is removed. The residue is then thrown out and subjected to a second and third washing. After about 36 hours, the supernatant fluid in the tub is siphoned off, leaving a layer of starch at the bottom about $2\frac{1}{2}$ feet thick. A yellowish scum which forms on the top of the starch is first scraped off and the soft pasty mass is then scooped out. For this purpose, a special cutting implement, having a long chisel-shaped blade, bent in the middle and fixed in a wooden handle, is used. The blocks of starch are then transferred to another wooden tub filled with fresh water.

These tubs are in turn subjected to a vigorous stirring with a wooden paddle-shaped instrument. The suspended starch is then baled out by another labourer who pours it over a sieve made from the ribs of coconut palm leaves, which is placed at the upper end of a wooden trough which slopes away from the tub. At the lower end of the trough a number of wooden slats on which a piece of calico is spread, are placed. As the trough fills, the number of slats is increased so as to retain the increasing quantity of starch. When the trough is full, the starch is allowed to settle for two to three hours, and its surface cleaned of all

foreign matter. It is then cut into blocks and transferred to a raised platform or table. The whole process is similar in many respects to the preparation of tapioca starch,* and, in Johore, when supplies of tapioca roots are scarce, sago palm trunks are often purchased by factories and treated exactly in the same manner as tapioca roots for the extraction of starch.

When the weather is fine, the blocks of starch are removed to a concrete or tiled drying ground, where they are broken up into small fragments to facilitate drying. The flour is then spread on mats and raked occasionally. Six hours' drying is considered sufficient. In the event of rain falling, the flour is wrapped up in the mats and laid on wooden platforms raised a few inches off the ground by bricks, and is further protected from the rain by matting. The drying ground, being in the form of a series of undulating ridges, provides protection from flooding during a heavy storm, while the good run-off for surface water enables drying to be continued with the mininum delay after the rain has stopped.

Preparation of Sago "Pearl".—A better quality starch is used for the manufacture of "pearl". It is first powdered and then passed through a sieve composed of coconut leaf-ribs, having a gauge of 1/6th inch. After sieving, the starch is transferred to an oblong-shaped bag, the mouth of which is kept open by two pieces of wood tied crosswise. The bag is suspended by a cord from the roof and is rocked backwards and forwards for about ten minutes, resulting in the starch grains forming small spheres. The time required for the operation depends on the size of "pearl" desired.

The "pearl" is then passed through a similar type of sieve having a mesh of 1/7th inch and later through an iron gauze sieve of the same mesh; it is then fried or cooked.

In the cooking of "pearl", iron pans having a diameter of about 2½ feet and a depth of 6 inches are used. These are set in cemented firebrick over a furnace, which is fired externally.

Labourers engaged in the cooking of the "pearl" are provided with a piece of cloth, some "choon tay oil" (tengkawan fat) derived from the seeds of *Isoptera borneensis* and *Diplocnema sebifera,* an oval or kidney-shaped bamboo tray, a short wooden knife, shaped to fit the curvature of the iron pan, and a small wooden tub.

The pan is wiped with the cloth, which has previously been soaked in tengkawan fat, and 4 to 5 lbs. of "pearl" are thrown in. This is vigorously stirred for five minutes and then removed and passed through a galvanized iron sieve of 1/8th inch mesh, for sizing. The "pearl" now undergoes a kind of baking. It is placed on a brick platform, about 50 feet in length and 15 feet wide, which is heated by fires burning beneath, and left there for four hours, during which time it is frequently raked to obtain a uniform appearance. Finally it is passed through a sieve with round holes of a diameter of 1/8th inch, and later through a coarse muslin sieve. It is then ready for export.

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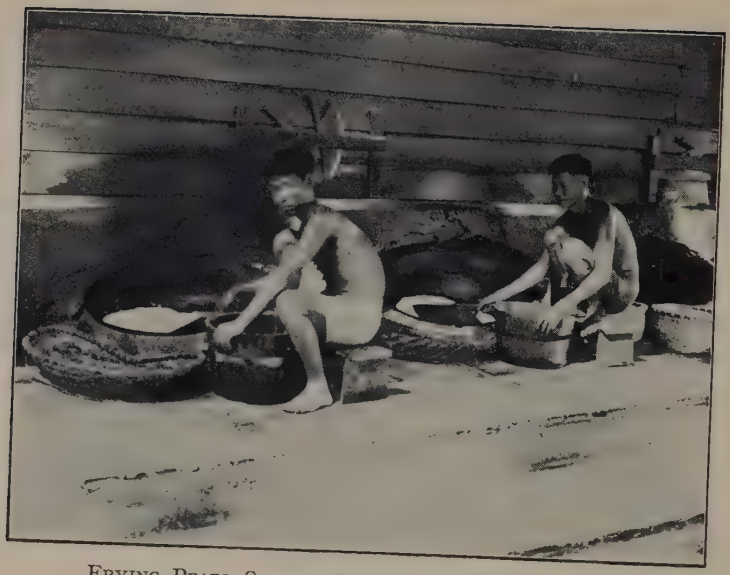
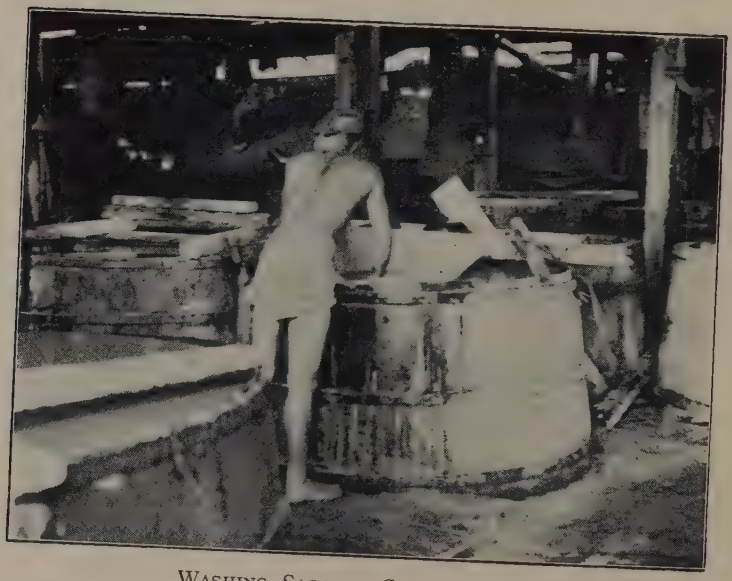
* Tapioca in Malaya, V. R. Greenstreet and J. Lambourne, Bulletin, Department of Agriculture, S.S. & F.M.S., General Series No. 13, 1933.

Raw Sago Factory, Close up view.

Interior of Raw Sago Factory.



Frying Pearl Sago in Pans set over a Furnace.



Washing Sago in Cheese Cloth.

Sago refuse, a by-product of the industry, is much used in pig-rearing by Chinese market gardeners, while the *ataps* made from the leaves are more lasting and better than those produced from the Nipah palm, *Nipa fruticans* Wurmb.

Cost of Production.

The following costs of production are based on a Chinese-owned factory with an output of 5,000 piculs (300 tons) of prepared sago per month.

Capital	$
Land and factory, office, labourers' quarters	40,000
Equipment	8,000
Cost of four junks	2,000
Total ...	$50,000

The factory, complete with equipment and junks, is generally owned by a capitalist and leased to the operator.

Working Costs, per month	$
1. Upkeep of junks and labourers' wages	300
2. Insurance on goods and equipment	20
3. Rent of factory	150
4. Labourers' wages. 100 @ $25 (average)	2,500
5. Manager's salary	100
6. Salary of 7 clerks	200
7. Water and light	325
8. Food supply to staff and labourers	500
9. Supervisors' wages (4 head labourers)	150
10. Lorry hire	60
11. Fuel	450
12. Sundry expenditure: medical, repairs, replacements ...	300
Total ...	$5,055

Labour.

In a factory with a capacity of 300 tons of prepared sago per month, about 100 labourers are employed. They work in two shifts, namely from 4 a.m. to 1.30 p.m. and from 4 p.m. to 9 p.m. The second short shift is of fryers and sievers, for without this second shift output would be held up owing to the greater speed for completion of the earlier stages of manufacture. It suggests bad factory organization in that the frying and sieving department is not sufficiently large. The distribution of this labour in the factory is as follows:—

First washing	8 men
Second washing	4 ,,
Third washing	4 ,,
Removing blocks of starch	4 ,,

First sieving	4 men
Second sieving	3 ,,
Third sieving	5 ,,
Rocking hammocks	5 ,,
Frying starch on pans	9 ,,
Rubbing and grinding lumpy "pearls"	2 ,,
Chopping wood and fueling	2 ,,
Breaking block starch and sun-drying	18 ,,
Baking on oven	3 ,,
Sundry labourers	2 ,,
	73 men

The remaining 27 men are fryers and sievers, who because of the heat in which they have to work and the amount of work to be completed, carry out their task in the evening.

In the table below is given the cost of production of Flour and Pearl sago per picul, when the price of raw rasped sago is $50 to $65 per koyan (5,333 1/3 lbs.), the present price range.

It is estimated that one koyan of raw rasped sago will give 22 piculs of sago flour or 20 piculs of pearl. In the factory mentioned, production is about 60 per cent. flour and 40 per cent. pearl.

It should be noted that packing is charged extra at the rate of 50 cents for every bag supplied and filled at the factory.

	Price of Raw Sago per Koyan	Gen. Factory Charges Items 1-3, 7-8, 10-12	Labour Items 4, 5, 6, 9.	Cost of Raw Sago	Total
Flour	$50	42 cents	50 cents	$2.28	$3.20
	$65	42 cents	50 cents	$2.96	$3.88
Pearl	$50	42 cents	75 cents	$2.51	$3.68
	$65	42 cents	75 cents	$3.26	$4.43

The present (June 1937) Singapore wholesale market prices per picul of sago are Pearl, Small Fair $5.69, Flour, Sarawak Fair $3.55.

THE TOXIC CONTENT OF HAIARI OR CUBÉ ROOT

BY
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Introductory.

An account was given in a previous number of this Journal (1) of the introduction to Malaya from British Guiana through the agency of the Royal Botanic Gardens, Kew, of a consignment of plants of black and white haiari respectively.

Haiari is the name applied in British Guiana to plants belonging to the genus *Lonchocarpus*. This genus is widely represented in South America and Central America. The roots of many of the species possess similar insecticidal properties to derris. The roots of *L. nicou* appear to be richest in insecticidal constituents and this plant is being cultivated on a large scale on plantations in South America, more especially in Peru (2), where it is known as "cubé".

Exports of cubé root from South America, both to Europe and the United States of America, are increasing steadily and this product constitutes a serious rival to derris.

Specimens of the plants on reaching maturity were despatched to the Royal Botanic Gardens, Kew, for identification. The specimens were forwarded to the New York Botanical Garden, who stated that the black haiari was *Lonchocarpus chrysophyllus* Kleinh. and the white haiari was *Lonchocarpus Martynii* A. C. Smith. The latter is apparently a new species.

In view of the growing importance of cubé root it is unfortunate that neither of the plants was found to be *L. nicou*, thereby allowing a fair comparison to be made between the two competitors in the insecticidal market.

The present paper gives an account of the results of an investigation in which an attempt has been made to correlate variation in toxic content of root with age of plant. Details are also given of average yields of root from individual plants at varying ages.

Method of Analysis.

A similar procedure was adopted to that followed with derris root (3) except that analyses were made of "coarse" roots in addition to those of "fine" or marketable roots.

Compared with derris, the grinding of the root in the laboratory mill is a much quicker operation. The ease with which the material can be ground is doubtless attributable to the soft spongy nature of the root.

Analysis was restricted to the determination of rotenone and ether extract.

Yield of Root.

Table I gives the details for average yields of air-dry root (moisture content 8 per cent.), for a few individual plants of the two species.

In the case of *L. Martynii*, which produces root in much greater abundance than *L. chrysophyllus*, yields from both two-year old and four-year old plants are included. The two-year old plants were raised from cuttings taken from the original stock.

Table I.

Average Yield of Air-dry Root from Plants of Varying Ages.

Species of *Lonchocarpus*	No. of Plants	Plants 2 years old			No. of Plants	Plants 4 years old		
		Coarse Roots	Fine Roots	Total		Coarse Roots	Fine Roots	Total
		ozs.	ozs.	ozs.		ozs.	ozs.	ozs.
L. chrysophyllus ...	No plants				4	No roots	7.00	7.00
L. Martynii ...	4	7.60	24.95	32.55	3	9.65	27.70	37.35

Compared with derris plants at 2 years old, the figures indicate the superiority of both species, particularly *L. Martynii*, in respect of root development.

Further, a comparison of the figures for plants of *L. Martynii* indicates only a relatively small increase in root formation between 2 years and 4 years.

Toxic Content of Root.

Tables II and III give the results of analysis of roots of both species from plants of varying ages.

In the case of the figures for *L. Martynii* at 2 years of age, the first set (a) refers to roots from the original plants, and the second set (b) to those from cuttings established from those plants.

Table II.

Average Rotenone Content of Root from Plants of Varying Ages.

(Moisture-free basis)

Age of Plants	*L. chrysophyllus*		*L. Martynii*	
	Coarse Roots	Fine Roots	Coarse Roots	Fine Roots
years	per cent.	per cent.	per cent.	per cent.
2	No roots	2.97	(a) No roots (b) 1.32	0.82 0.69
4	do.	4.33	1.11	0.84

Compared with high-grade derris, for example *D. elliptica,* Changi No. 3, the roots of which average 9 per cent. on a similar basis, *L. chrysophyllus* has only a low rotenone content, while that of *L. Martynii* is almost negligible.

In the case of *L. Martynii* the higher rotenone content of the "coarse" roots compared with the "fine" roots is of interest. This is contrary to the results of analysis of derris root.

Table III.

Average Ether Extract of Root from Plants of Varying Ages.

(Moisture-free basis)

Age of Plants	*L. chrysophyllus*		*L. Martynii*	
	Coarse Roots	Fine Roots	Coarse Roots	Fine Roots
years	per cent.	per cent.	per cent.	per cent.
2	No roots	7.92	(a) No roots (b) 7.36	7.66 8.57
3	6.81	8.86	6.81	8.03
4	No roots	8.84	6.72	8.61

Similarly to the rotenone content, the ether extract of both species is low compared with that of high-grade derris. At all ages the ether extract figure of the "fine" roots is greater than that of the "coarse" roots. This is contrary to the results found with the rotenone content.

A further interesting feature of the figures relating to *L. Martynii* is the close agreement between those for the original plants and those for the next generation established as cuttings from those plants.

An examination of the proportions of the figures for rotenone content and for ether extract shows a remarkably high ratio in the case of *L. chrysophyllus* when 4 years old. The ratio is approximately 47 per cent. compared with a figure of 10 per cent. for *L. Martynii* at the same age.

Conclusions.

The low toxic contents, particularly in the case of *L. Martynii,* are disappointing in view of the high yield of root at 24 months.

Compared with high-grade derris, for example *D. elliptica,* Changi No. 3, neither species could be recommended for cultivation.

Our experiments have shewn that the approximate yields from two-year old plants of this race of *D. elliptica* are as follows:—

Average yield of air-dry marketable root per plant	...	5 ozs.
		per cent.
Rotenone (moisture-free basis)	...	9.0
Ether extract (do.)	...	27.0

As a source of rotenone, more than twice the weight of root of *L. chrysophyllus* would be required to yield the same amount of rotenone as Changi No. 3 and there is only an additional 40 per cent. yield of root in favour of *L. chrysophyllus*.

Further, between three and four times the weight of root of *L. Martynii* would be required to yield the same amount of ether extract as Changi No. 3. Although the figures indicate that the average yield of air-dry marketable root per plant of *L. Martynii* is nearly five times as much as that for Changi No. 3 it is unlikely that the slightly greater yield of ether extract would compensate for the increased charges incurred in the preparation of the root for the market.

Acknowledgment.

The writer wishes to acknowledge the assistance of Inche Othman bin Mohamed Lela, Malay Agricultural Assistant, who has been responsible for the greater part of the analytical work in this investigation.

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CONDITIONS ON RUBBER SMALL HOLDINGS IN MALAYA.

2nd Quarter, 1937.

Prepared by the Economics Branch of the Department of Agriculture, S.S. & F.M.S. in collaboration with the Field Branch of the Department.

Rainfall.

The outstanding feature of the quarter was the exceptionally dry month of June, conditions almost amounting to drought in some districts. April was extremely wet, while May was dry.

Prices.

The market fell heavily at the beginning of April, and continued to weaken throughout the quarter with the exception of a temporary recovery towards the end of April, and again in the early part of May. Prices for small-holders' rubber followed the trend of the market, and are given in Tables I and II.

Production.

Table III summarizes production on small holdings during the quarter and for the half-year. This table is compiled from the monthly reports of production, stocks, imports and exports of rubber published by the Registrar-General of Statistics, S.S. and F.M.S.

Tapping.

The usual quarterly survey of small holdings out of tapping was made, estimates being calculated by counting the number of holdings out of tapping and applying the percentage to the total area of small holdings in the relative District.

The results of the survey are given in Table IV, and Table V summarizes the totals in comparison with the first quarter and with the previous year.

It will be seen that there was a very considerable decrease in the area out of tapping and this is no doubt due to the substantial increase in the value of uncouponed rubber—one report shows an increase of $8 per picul—and to the fall in the value of coupons—the same report quotes a drop from $35 in March to $10 in June. It is to be presumed that the latter fall in value is the natural corollary of the increased demand for uncouponed rubber to cover export rights and coupons purchased at the commencement of the quarter.

Condition of Holdings.

Little specific mention of the condition of holdings is made in the reports for the second quarter beyond remarks to the effect that the improvement in upkeep is generally being maintained.

Table I.

Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.

(In Straits dollars per picul (133 1/3 lbs.))

2nd Quarter 1937.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
			APRIL					
Smoked sheet	48.00-61.00	43.00-57.00	41.00-56.80	43.00-56.70	42.00-57.00	48.00-58.00	44.30-57.50	45.00-57.00
Unsmoked sheet	46.00-60.00	40.00-55.50	35.00-55.00	40.00-56.00	40.76-55.15	46.00-56.50	42.00-55.50	40.00-56.00
Scrap	32.00-48.00	35.00-42.00	30.00-42.00	—	37.00-47.00	42.00-50.00	33.00-45.00	30.00-48.00
			MAY					
Smoked sheet	45.00-50.00	40.50-48.00	37.00-50.00	36.00-56.20	41.00-48.00	45.00-50.00	40.00-48.50	40.00-48.00
Unsmoked sheet	44.00-49.00	37.00-48.00	34.00-46.00	34.00-46.00	37.00-47.40	43.00-48.50	38.00-45.00	38.00-47.00
Scrap	28.00-40.00	30.00-33.00	27.00-33.00	—	32.80-37.00	38.00-43.50	30.00-40.00	27.00-37.50
			JUNE					
Smoked sheet	39.00-45.50	36.00-43.00	37.00-42.30	34.00-43.50	35.00-43.50	40.00-43.00	36.00-41.50	36.00-43.20
Unsmoked sheet	30.00-45.00	32.00-44.00	30.00-41.50	30.00-41.00	33.00-44.90	38.50-42.00	35.00-38.00	32.00-42.70
Scrap	22.00-35.00	16.00-20.00	25.00-27.00	—	25.00-28.00	30.00-37.50	25.00-34.00	25.00-31.00

Table II.

Mean of Lowest and Highest Rubber Prices Paid by Local Dealers at a number of Centres in each State.

(In Straits dollars per picul (133 1/3 lbs.))

2nd Quarter 1937.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
				APRIL				
Smoked sheet	51.81-59.09	47.04-54.00	45.83-49.88	44.79-54.54	44.28-54.80	49.50-54.17	47.46-55.94	46.78-51.98
Unsmoked sheet	47.75-58.62	44.41-50.12	40.88-47.00	42.20-52.70	41.88-51.34	47.50-52.33	45.20-54.00	44.66-50.60
Scrap	37.00-44.25	35.50-41.00	35.50-36 00	—	37.00-47.00	43.83-47.50	37.40-43.20	34.30-37.80
				MAY				
Smoked sheet	45.67-47.83	42.12-45.87	42.58-45.17	41.50-49.26	42.15-45.92	45.17-47.50	42.40-45.60	42.43-45.46
Unsmoked sheet	45.00-47.38	40.05-42.34	37.50-43.00	39.50-44.84	40.50-44.12	43.50-46.00	40.30-43.60	40.73-43.75
Scrap	32.75-36.00	30.00-33.00	29.00-31.50	—	32.80-37.00	39.83-42.50	33.40-37.20	30.93-32.95
				JUNE				
Smoked sheet	40.67-44.00	38.01-45.93	38.50-40.55	36.45-41.62	36.42-41.25	40.17-42.50	38.00-39.90	38.13-40.37
Unsmoked sheet	36.25-43.00	35.17-38.46	33.25-37.88	33.00-38.60	35.72-39.16	38.83-40.33	35.20-37.60	35.11-38.64
Scrap	27.10-30.50	16.00-20.00	25.50-26.00	—	25.00-28.00	34.00-34.83	28.40-31.60	24.03-26.10

Table III.

Production of Rubber on Small Holdings

(in tons)

	Total Half-Year 1936	1st Quarter 1937	2nd Quarter 1937	Total Half-Year 1937
Federated Malay States ...	27,904	19,764	19,975	39,739
Unfederated Malay States ...	25,110	19,310	18,568	37,878
Straits Settlements ...	6,016	3,769	4,198	7,967
Total ...	59,030	42,843	42,741	85,584

Diseases.

The exceptionally dry weather in June assisted in the control of Mouldy Rot. The wet weather of April was responsible for virulent attacks in some districts, and one report mentions several cases of re-infection due to increased tapping. The efforts of the Department of Agriculture directed towards the discontinuance of tar as a fungicide for this disease continue to meet with success.

Fresh outbreaks of *Oidium Heveae*, secondary leaf fall, were reported in some districts, but fortunately were not of a serious nature, and were completely controlled.

Excessive tapping in a district of Johore resulted in an appreciable increase in the number of trees showing symptoms of Brown Bast.

General.

A further small holding in Johore was budded during the quarter under review. Out of 300 trees only 57 buddings were successful, but the owner is continuing with a fresh supply of budwood.

A Perak report states that a recently budded Malay small holding is doing well, and that four more holdings, averaging about 2 acres each, were budded during June.

In connexion with the rubber dealers' scheme in Pahang it is reported that with increased quotas there has been a tendency for dealers to pay the same prices for good and poor quality sheet. This has been checked as soon as discovered but small-holders are generally slow to learn the uses of the price board and samples.

Table IV.

Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of June, 1937.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage
Batang Padang	33,227	4,700	14	Klang	15,410	2,500	16	Seremban	22,176	13,500	61	Raub	9,342	1,600	17
Kinta	36,000	2,500	7	Kuala Langat	23,333	3,700	16	Tampin	16,961	4,600	27	Kuala Lipis	14,588	2,900	20
Kuala Kangsar	79,572	9,500	12	Ulu Langat	39,856	6,000	15	Kuala Pilah	26,586	12,800	48	Bentong	11,574	1,800	16
Upper Perak	12,680	1,800	14	Ulu Selangor	25,857	3,100	12	Jelebu	8,917	1,000	11	Other Districts†	40,383	7,300	18
Larut & Selama	38,210	2,700	7	Kuala Lumpur	19,327	5,200	27	Port Dickson	11,634	3,500	30				
Krian	9,270	3,200	34	Kuala Selangor†	9,512	1,400	15								
Lower Perak*	25,982	3,600	14												
Dindings	9,273	5,700	61												
	244,304	33,700	14		133,295	21,900	15		86,274	35,400	41		75,887	13,600	18

MALACCA				PENANG & P. WELLESLEY				SINGAPORE			
District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage
Central	13,109	2,100	16	North	3,941	200	4	Singapore	20,591	200	1
Alor Gajah	30,203	1,800	6	Central	9,540	2,300	24				
Jasin	22,883	4,800	21	South	7,508	900	12				
				Penang	15,822	900	6				
	66,195	8,700	13		36,820	4,300	11		20,591	200	1

JOHORE	322,225	48,300	15
KEDAH	100,691	16,100	16
PERLIS			
KELANTAN & ‡ TRENGGANU	77,016	13,100	17

The percentage of areas out of tapping in March, 1937, was as follows:—Perak 21, Selangor 23, Negri Sembilan 58, Pahang 35, Malacca 28, Penang and Province Wellesley 26, Singapore 1, Johore 20, Kedah 27.

* Estimated from percentage for Kuala Kangsar.

†Estimated from percentage for other Districts in the State.

‡Estimated from percentage for rest of Malaya.

Table V.

Comparison of Areas of Rubber Small Holdings Out of Tapping.

	June, 1936		March, 1937 .		June, 1937	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
F.M.S.	219,300	40.0	158,900	29.5	104,600	19.4
S. S.	35,600	29.0	28,100	22.7	13,200	10.7
U.M.S.	137,800	34.7	111,600	23.3	77,500	15.5
Malaya	428,700	36.8	298,600	25.7	195,300	16.8

A number of new smoke cabinets were erected during the quarter, but, unless small-holders are continually visited and given advice, there is a tendency to abandon the manufacture of smoked sheet and return to old methods. It should be added that this tendency is due principally to the small premium granted by dealers for smoked sheet which is often insufficient to repay the extra labour involved.

Review.

Reports of the Research, Economic and Agricultural Education Branches for the Year 1936.

Special Bulletin, General Series No. 26. Department of Agriculture, Straits Settlements and Federated Malay States. 1937. 97 pp. Price 50 cents (Straits currency) or 1s. 2d. post free.

The annual publication as a separate bulletin of the reports of the Research Branch of the Department of Agriculture and also those of the Economics and the Agricultural Education Branches has made available in some detail an account of the progress of work within the Department. In this year's publication the report of the Canning Officer appointed early in the year is an innovation.

The increasing volume of enquiries on a wide range of agricultural subjects which is received by the Department is evidence that the public recognizes the advisory facilities offered and also is more fully informed of the lines of investigations undertaken by individual officers. It is probable that such publications as the present are the principal means by which this close touch between the Department and the public is effected.

Necessarily, research workers read such reports as these a good deal more carefully than does the planter in this country. The latter, however, may refer to the work of each Division of the Department on a crop in which he is particularly interested, and thereby gain a very good insight into the views of workers and of the present position of the industry in Malaya.

Malayan Agricultural Statistics 1936.

D. H. Grist. Special Bulletin, Economic Series No. 8, Department of Agriculture, Straits Settlements and Federated Malay States. 91 tables, 2 graphs. 1937. Price 50 cents (Straits currency) or 1s. 2d. post free.

While annual reports of the Department of Agriculture provide a very general review of Malayan agriculture and of the work of individual officers, they do not offer any detailed information on areas, distribution, production and agricultural trade. This information is, however, available in a convenient form in *Malayan Agricultural Statistics 1936,* this being the sixth annual publication of this bulletin.

The author has endeavoured to set down the statistical position concerning crops grown in Malaya and of the import and export trade in agricultural products which—at least theoretically, though perhaps not at present economically—might be produced in this country. In most cases, trade figures go back 14 years, and thus obviate the necessity of reference to fourteen annual publications should the enquirer wish to see the development of the trade in a particular product.

The increasing number of references made by writers in various parts of the world to the information given in this series of publications is evidence of its utility and reliability, and the present issue may be commended to those who have use of a readily available compendium of information on the statistical position of Malayan agriculture.

Miscellaneous.

EMPIRE EXHIBITION 1938.

From May to October next year Glasgow is to be the scene of an Empire Exhibition In addition to stimulating Scottish work and production and directing attention to Scotland's historical and scenic attractions, the Exhibition is designed to illustrate the progress and show the resources and potentialities of the British Empire; to foster Empire trade and a closer friendship among the peoples of the British Commonwealth of Nations; and to emphasize to the world the peaceful aspirations of the British Commonwealth.

The British Government have announced their decision to take part officially in the Exhibition and invitations to participate have been extended to the Governments of the Dominions, India and the Colonies.

It has been decided that Malaya shall participate in this Exhibition and a space in the Colonial Pavilion of over 5000 square feet has been secured for this purpose.

His Excellency the Governor has appointed the Hon'ble Mr. O. T. Faulkner, C.M.G., Adviser on Agriculture, to be Chairman of a Malayan Committee to plan a comprehensive display indicating the development of the country with special emphasis on communications, sea and air ports, agriculture, and mining. In view of the very short time available, His Excellency has approved the appointment of only a small executive Committee to assist Mr. Faulkner. It consists of Mr. H. B. Egmont Hake, C.B.E., Mr. A. A. Henggeler, Mr. E. E. F. Pretty, M.C.S., and Mr. D. H. Grist who is also Secretary. While the Committee is small, the prominent position held by these gentlemen will ensure that the principal Malayan industries will secure adequate representation. If the work of the Committee is to be successful its members look for co-operation from many quarters, and they trust that all who are asked to assist will do so and thus further the object of the Committee which is to ensure that the participation of this country shall be fully worthy of the position which Malaya holds in the Colonial Empire.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

July, 1937.

The Weather.

In Kedah the rainfall was below the average for the month and was poorly distributed. In Penang, precipitation was above normal but the rainfall in the extreme south and north of Province Wellesley was below average for the month.

Exceptionally heavy rain for the time of year fell throughout Malacca and this wet belt extended to Seremban and to Tangkak in Johore, although the precipitation was not above the normal for the month at Kuala Pilah and was distinctly below average at Muar.

At Taiping the total recorded for the month also exceeded the average.

Elsewhere in the Peninsula the comparatively dry conditions normal for July prevailed generally with a tendency to more unsettled weather at the end of the month.

Remarks on Crops.

Padi.—In Kedah, planting was delayed on account of water shortage.

The Sungei Acheh area of Province Wellesley has experienced shortage of water through the Sungei Ijok diversion scheme not yet being brought into operation and a continuance of dry weather has also delayed operations in Krian, especially in the Semanggol area. In the Sungei Manik area of Perak the later irrigation and planting dates adopted have resulted, as was expected, in a long delay between turning water into the distributaries and saturation of the dry land. Many years' experience of irrigation in Krian has proved the wisdom of beginning irrigation before the moisture from the April and May rains is lost from the soil. In the Panchang Bedena area of Selangor some further progress was made in clearing stumps and timber before the next padi season commences there.

In Pahang, Malacca and Kelantan seasonal operations continued satisfactorily except that in Kelantan frequent showers have delayed the planting of dry padi.

Rubber.—There was a slight decline in price of this commodity. From most parts a still further drop in the price of coupons is recorded whereas the price of uncouponed rubber has been generally maintained, although a slightly decreased price is reported from Penang and South Perak. The general price for coupons per picul equivalent was $9, and $25 a picul was a common price for uncouponed rubber. From several Circles it is reported that there is a tendency towards a greater difference in the prices of smoked and unsmoked sheet.

Agricultural and Padi Stations.

Agricultural Stations.—At Gajah Mati in Kedah the erection of nursery sheds and poultry runs was completed. Crops at this Station have suffered considerably from continued dry weather. At Selama in Perak rather better success than formerly is reported in the budding of durians and pulasans.

In Selangor the poultry are doing well at Cheras and pullets are coming into lay at ages of 24 weeks upwards. At Telok Datoh the coffee, planted in November, 1935, is flowering heavily for the first time. Trees of Gliricidia have been pruned to shape them for top shade and they show promise of being very suitable for the purpose.

At Rembau in Negri Sembilan rambutans of the Penang varieties fruited for the first time. The fruit was of excellent quality and size, but a check identification showed that some trees had been wrongly labelled.

The Farm School at Sungei Udang in Malacca began a new term on June 28th with 19 pupils, six having left during the holidays. A large consignment of planting material from the Central Experiment Station, Serdang, was received for planting on the Central Agricultural Station, Kelantan.

The plants at the Pineapple Station, Johore, continue to make good growth notwithstanding dry weather. At the Singapore Station "wilt" is still an unsolved problem and, in consequence, cropping has been poor.

Padi Stations.—At Telok Chengai in Kedah the ploughing, which was held up for a time owing to water shortage, was completed by the middle of the month.

In Province Wellesley conditions are good at all Stations. It is fortunate that at the Sungei Acheh Station water is more plentiful than on many of the lands in the area.

In Krian, water was rather short at Briah and Selinsing Stations, but satisfactory at the others.

At Sungei Manik long season strains have been sown on *rakit* nurseries situated in the bund borrow pits on account of water shortage. It is expected that water will be sufficiently plentiful for the first transplanting by the time the seedlings are ready for it.

At Kuala Klawang in Negri Sembilan serious damage to seedlings in the nurseries was done by a very small fly larva. Similar damage occurred elsewhere in Negri Sembilan and Malacca. This is the first recorded occurrence of damage by this pest and the Entomologist wishes that, if any other cases have been noted, he should be given particulars. Quite young seedlings are attacked, the leaves turn brown and the nursery looks very much as if a fungus disease had spread rapidly over it and killed the plants.

Conditions at the Malacca Stations are satisfactory except that the heavy rain experienced has interfered with tractor ploughing and buffalo ploughs have had to be used on some of the deeper parts of the Mechanical Experiment area.

In Kelantan wet weather has held up the final harrowing for dry padi at the Central Station and bird damage and lack of moisture have combined rather to spoil the appearance of the wet padi nurseries at Bachok.

DEPARTMENTAL NOTES.

Meeting of the Agricultural Advisory Committee, 14th July 1937.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on 14th July 1937, under the chairmanship of the Hon'ble the Adviser on Agriculture (Mr. O. T. Faulkner, C.M.G.). The following is a brief summary of the discussions which took place.

Coconut Industry.—The chairman proposed to reopen with the Vegetable Oils Section of the United Planting Association of Malaya the question of an alternative scheme to that of the Malayan Mark Scheme which failed to receive support.

Pineapple Canning Industry.—The Canning Officer's headquarters will be transferred to Johore where an experimental canning factory will be established.

The meeting was informed that the agreement of packers was obtained to certain standard sizes of cans, and the State Governments concerned had approved and had passed the necessary regulations. Subsequently packers requested reconsideration of the matter, and had been informed that they might suggest any amendments to the regulations which they considered desirable before the standards are brought into force from 1st March 1938.

On the subject of the Pineapple Grading Scheme, the meeting was informed that all important points of the scheme had been agreed upon by the trade, but agreement had not yet been reached on the question of standard weights of contents of the cans. Until agreement was reached it would not be possible to submit the completed scheme to Government.

On the subject of new markets for canned pineapples, which was discussed, it was pointed out that quality was an important factor. The Chairman pointed out that the governing factor of quality of canned pineapples was ripeness of the fruit when canned rather than type of fruit used. He added that Government might be in a position to take the initiative by approaching packers and exporters in the matter of finding new markets, but in his opinion it would be necessary to inaugurate the Malayan Mark Scheme as a preliminary, to ensure that exports would be of reliable standard quality.

Tea.—The Committee examined the report of prices realized in London for tea from Cameron Highlands and from the lowlands, and also discussed various aspects of the Tea Control Enactment.

Fruit and Vegetable Station, Cameron Highlands.—The agricultural prospects of the Highlands were discussed. The Chairman stated that sanction had been given by Government for additional expenditure in 1938 to meet the cost of work in citrus trials, pig-keeping and vegetable-growing and the development of the area under quinine, as well as general development of the Station.

Oil Palms.—The Chairman stated that although no Government action had ever been taken to restrain further planting of oil palms, the recommendation of the Vegetable Oils Committee had had the effect of restricting recent planting of the crop. He had recommended that Government's attitude should now be to encourage rather than to restrict the planting of this crop.

Approved Grazing Areas.—The Chairman reported that at a meeting convened by the British Resident, Negri Sembilan, concerning the Negri Sembilan Livestock Improvement Scheme, it was proposed that reduction of quit rent to a minimum of $1 per acre should be made on all approved cattle-grazing areas on estates in the State, the reduction to be renewable from year to year if the pasture were properly maintained.

Amongst other subjects discussed were a proposal for the formation of a Development Company; contribution to the Imperial College of Tropical Agriculture, Trinidad; general policy for peasants and small-holders; dry-land crops for Pahang lowlands; and Farm Schools.

Staff.

Mr. E. J. H. Berwick, Agricultural Officer, Perak Central, was transferred to the Central Experiment Station, Serdang, as Acting Agriculturist with effect from 11th July, 1937.

DISTRICT AGRICULTURAL SHOWS.

During recent months a considerable number of agricultural Shows have been held throughout Malaya as indicated by the following figures: Perak 17; Selangor 6; Negri Sembilan 7; Pahang 12; Province Wellesley and Penang 4; Malacca 3; Johore 3; Kelantan 1.

These Shows have been of varying importance; some were State or District Agricultural Shows lasting two, and in one case three, days, while others were on a smaller scale and organized purely to deal with mukim or District entries for the All-Malayan Padi and Rubber Competitions, the prize-winning exhibits from all Shows appearing for final judging at the Central Competition held in conjunction with the Fourteenth Malayan Exhibition at Kuala Lumpur.

At the more important Shows exhibits of varying nature according to the locality were staged by the Department of Agriculture and by the Rubber Research Institute of Malaya.

RETIREMENT OF MR. F. W. SOUTH, M.A. (Cantab.).

After a service of 28 years, the last twenty-four of which he spent in Malaya, Mr. F. W. South, Chief Field Officer, retired on the 4th August, 1937.

His four years as Mycologist and Lecturer in Agricultural Science, Imperial Department of Agriculture for the West Indies, constituted valuable experience and earned for him early promotion to the newly-created post of Chief Agricultural Inspector, Federated Malay States and Straits Settlements.

In his new appointment Mr. South found ample scope for the exercise of his organizing abilities. The rapid growth of the rubber cultivation industry, together with the advent of a somewhat serious outbreak of locusts, taxed the resources of his numerically small Division, and it is to his credit that the services he was able to render to the rubber industry during those early years were ably executed, while the locust campaign which he organized was successful in eliminating this pest.

Of recent years the importance of Mr. South's Division increased, until in 1929 it was re-organized as the Field Branch with an ever-widening scope, both of territory and of duties. Mr. South has the satisfaction in retiring of seeing the Branch which he created functioning as an efficient link between the Research Branch and the agricultural community.

Mr. South acted with success as Head of the Department of Agriculture on many occasions.

Organization did not prevent Mr. South from the performance of research work. His earlier contributions to agricultural literature covered a number of problems connected with the identification and control of fungus diseases of tropical crops, while later articles and reports published in Malaya give evidence of his very detailed and accurate field observations.

Mr. South has elected to retire at a comparatively early age. His numerous friends in Malaya wish him many years of happiness in his retirement.

D. H. G.

Statistical.

MARKET PRICES.

July, 1937.

Major Crops.

Rubber.—The market fell heavily during July, there being a difference of $2\frac{7}{8}$ cents between opening and closing prices, and $3\frac{5}{8}$ cents between the highest and lowest quotations. Spot loose opened at $32\frac{1}{4}$ cents per lb., rising to $32\frac{3}{4}$ cents on the 2nd July. The price then fell steadily to $29\frac{1}{8}$ on the 24th, closing at $29\frac{5}{8}$ cents.

The average Singapore price for the month for No. 1 X Rubber Smoked Sheet was 30.72 cents per lb. as compared with 32.31 cents in June. The London average price was 9.15 pence per lb., and the New York price 18.79 cents gold, as compared with 9.57 pence and 19.20 cents gold in June.

Prices paid for small-holders' rubber at three centres during the month are shewn in Table I.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, July, 1937.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.					Kuala Kangsar, Perak.			Batu Pahat, Johore.			
	1	8	15	22	29	7	21	28	7	14	21	28
Smoked sheet		38.79		37.00	37.48	38.00	36.00	35.50				
Unsmoked sheet	36.23	35.50	34.00	34.37	33.35				35.00	33.00	33.50	33.50
Scrap				23.00	22.32							

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.
Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.
No purchases at Kuala Kangsar on the 14th June.

Palm Oil.—There was a further slight improvement in the market for Malayan oil, and the month's range of prices is shewn in Table II.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1937.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
July 2	£ 22. 0. 0	£ 11. 17. 6
„ 9	22. 0. 0	12. 0. 0
„ 16	23. 0. 0	12. 5. 0
„ 23	23. 10. 0	12. 7. 6
„ 30	23. 0. 0	12. 2. 6

Copra.—The Singapore market maintained its position and shewed some slight improvement, but there were constant minor fluctuations and the average prices for the month were lower than those of June. The range for the sun-dried grade was from an opening price of $5.75 per picul to $6.20 on the 23rd July, closing at $5.95, with an average of $5.97 as compared with $6.11 in the previous month. The mixed grade averaged $5.56 per picul as against $5.64 in June.

Copra cake continued unchanged at $2.50 per picul.

Rice.—The average wholesale Singapore prices of rice per picul in June were as follows:— Siam No. 2 (ordinary) $3.91, Rangoon No. 1 $3.57, Saigon No. 1 $3.65, as compared with $4.21, $3.62 and $3.60 in May, and $3.75, $3.50 and $3.50 in June 1936.

The average retail prices in cents per gantang of No. 2 Siam rice in June were: Singapore 28, Penang 35, Malacca 30, as compared with 28, 36 and 32 in May.

The average declared trade value of imports of rice during June was $3.90 per picul as compared with $3.88 in May and $3.91 in April.

Padi.—The Government Rice Mills, Perak, continued to pay $2 per picul for padi during July. Retail prices of padi ranged from 7 to 14 cents per gantang.

Pineapples.—The market has been dull, with the demand from the United Kingdom disappointing and stocks plentiful; prices improved slightly, however, in the second half of the month. Closing prices per case were:— G.A.Q.: Cubes $3.05, Sliced Flat $2.95, Sliced Tall $3.10; Golden Quality: $3.35, $3.35 and $3.45 respectively.

Prices of fresh fruit per 100 during July were as follows:— Selangor 60 to 70 cents; Singapore $1.60; Johore 1st quality 90 cents to $1.60, 2nd quality 50 cents to $1.20, 3rd quality 30 to 90 cents.

Beverages.

Tea.—During July nine consignments of Malayan tea were sold on the London market, three of upland and six of lowland tea. The former were sold at prices averaging 1s. 2¼d., 1s. 3d. and 1s. 3¼d. per lb., and the lowland tea at prices ranging from 1s. 1d. to 1s. 2½d. per lb.

Average London prices per lb. during July for consignments of tea from other countries were as follows:— Ceylon 1s. 3.22d., Java 1s. 1.59d., Indian Northern 1s. 3.25d., Indian Southern 1s. 2.50d., Sumatra 1s. 0.40d.

The latest Colombo average prices available quoted from *The Weekly Tea Market Report*, 20th July 1937, of the Colombo Brokers' Association, are as follows, in rupee cents per lb.:— High Grown Teas 84 cents, Medium Grown Teas 76 cents, Low Grown Teas 72 cents.

Coffee.—Prices of Sourabaya and Palembang coffees fell considerably in Singapore during July. The former averaged $12 to $14.10 per picul, and the latter $10 to $11.25.

Prices in Singapore of other varieties of coffee were as follows (per picul):— Liberian $18 falling to $17.50; Excelsa $12.50 falling to $12; Robusta $11.

Spices.

Arecanuts.—The following was the range of Singapore average prices per picul during July: Splits $5.60 to $7.95; Red Whole $7.25 to $9.15; Sliced $10.80 to $14.60.

The averages of the Singapore Chamber of Commerce quotations per picul were:— Best $7.42, Medium $6.92, Mixed $6.10.

Pepper.—With a slight increase in demand prices advanced 50 cents per picul at the close of the month. Average prices per picul in Singapore for July were:— Singapore Black $9.25, Singapore White $16.10, Muntok White $16.60.

Nutmegs.—The price for both 110's and 80's improved from $32 per picul to $35 in the second half of the month, the average being $33 as compared with $33.38 in June.

Mace.—Siouw weakened in the middle of the month but recovered at the close, averaging $97 per picul as against $105 in June. Amboina fell $1 to average $85.20 per picul as compared with $94.50 in June.

Cloves.—Quotations for Zanzibar and Amboina remained nominal at $40 per picul.

Miscellaneous.

Derris (Tuba Root).—The demand during July was poor, and where enquiries did exist, buyers' prices were at low levels with the result that the market fell heavily. Quotations were: roots sold on rotenone content $41 per picul; roots sold on a basis of ether extract $22 per picul. The June prices were $45 and $26 respectively.

Gambier.—Block improved steadily to $9.50 per picul, averaging $9.05 for the month as compared with the June average of $8. No. 1 Cube fell 50 cents, averaging $16.90 as against $17 in June.

Tapioca.—Prices in Singapore were lower during July, averages per picul being: Flake Fair $4.96, Seed Pearl $5.40, Medium Pearl $5.74, as compared with $5, $5.65 and $6 respectively in June.

Sago.—There was a further fall in the Singapore market, average prices per picul being: Pearl, Small Fair $5.29, Flour, Sarawak Fair $3.35, as against $5.69 and $3.55 respectively in June.

Tobacco.—The range of prices of dried leaf per picul was as follows:— 1st quality $27.25 to $47.50; 2nd quality $20 to $39; 3rd quality $11 to $28. The range in Johore was from $16 to $40. Prices of prepared tobacco in Kelantan were: $70 to $160, $50 to $120, $30 to $80 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for imported coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2.

GENERAL RICE SUMMARY*

June, 1937.

Malaya.—Imports of foreign rice during June were 52,775 tons† and exports 7,817 tons, net imports being 44,958 tons as compared with 49,058 tons in 1936. Net imports for the half-year totalled 264,344 tons as against 260,372 tons in 1936.¶

Of the imports during June 44 per cent. were consigned to Singapore, 18 per cent. to Penang, 7 per cent. to Malacca, 24 per cent. to the Federated Malay States, and 7 per cent. to the Unfederated Malay States. The foreign imports by countries of origin were as follows (in tons, percentages in brackets):— Siam 27,055 (51.3), Burma 21,951 (41.6), French Indo-China 2,982 (5.6), other countries 787 (1.5).

Of the exports during June, 59 per cent. were consigned to the Netherlands Indies, and 41 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):— Siam 6,790 (86.9), Burma 414 (5.3), French Indo-China 532 (6.8), parboiled 47 (0.6), local production 34 (0.4).

India and Burma.—Foreign exports from January to May totalled 573,000 tons as compared with 665,000 tons in 1936, a decrease of 13.8 per cent. Of these exports 4.6 per cent. were to the United Kingdom, 6.6 per cent. to the Continent of Europe, 26.5 per cent. to Ceylon, 24.1 per cent. to the Straits Settlements and the Far East, and 38.2 per cent. to other countries. The corresponding 1936 percentages were 4.4, 21.2, 26.0, 18.6, and 29.8.

Siam.—Exports of rice and rice products from Bangkok during April were 75,398 tons, as compared with 153,568 tons in 1936.

Japan.—According to a report (dated 3rd June 1937) on the first Formosan rice crop for 1937, the area planted shews a slight decrease when compared with 1936, the relative figures being 728,743 acres and 744,827 acres. Estimated production for 1937 is 638,148 tons as compared with 664,559 tons in 1936.

French Indo-China.—Entries of padi into Cholon during the first half-year totalled 856,024 tons as compared with 877,229 tons in 1936, a decrease of 2.4 per cent. Exports of rice during the same period were 786,334 tons, a decrease of 16 per cent. as compared with 936,283 tons in 1936.

The Netherlands Indies.—The latest information was published in the May Summary.

Ceylon.—Imports during the first half-year totalled 274,089 tons as compared with 270,682 tons in 1936, an increase of 1.3 per cent. Of these imports 17 per cent. were from British India, 69.2 per cent. from Burma, 0.1 per cent. from the Straits Settlements, and 13.7 per cent. from other countries. The 1936 percentages were 12.9, 60.8, 0.2, and 26.1 respectively.

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* Abridged from the Rice Summary for June 1937, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1936.

Europe and America.—Shipments from the East to Europe during the period 1st January to 3rd June totalled 620,656 tons as compared with 573,890 tons in 1936, an increase of 8.1 per cent. Of these shipments 45.5 per cent. were from Burma, 45.9 per cent. from Saigon, 5.9 per cent. from Siam, and 2.7 per cent. from Bengal. The corresponding 1936 percentages were 38.2, 53.0, 7.2 and 1.6.

Shipments to the Levant from the 1st January to the 27th May were 7,590 tons as against 7,418 tons in 1936, an increase of 2.3 per cent. Shipments for Cuba, West Indies, and America from the 1st January to 3rd June were 127,026 tons as compared with 111,317 tons in 1936, an increase of 14.1 per cent.

INTERNATIONAL YEARBOOK OF AGRICULTURAL STATISTICS 1935-36 AND 1936-37.

This important yearbook is published at Rome by the International Institute of Agriculture, and provides world statistics relative to agriculture.

In a preface to the present edition it is explained that an effort has been made to bring the subject matter as much up-to-date as possible by the inclusion of statistics for 1936-37, though incomplete and, in general, provisional.

There are eight sections, dealing respectively with: area and population; apportionment of areas, agricultural production and livestock statistics; area and production of the various crops; livestock; trade—(a) imports and exports of principal agricultural products, (b) imports and exports of cereals by commercial season; stocks of cereals, prices, ocean freights and rates of exchange; fertilizers.

The sections consist entirely of tables and give statistics for every country in the world from which information has been available. They are prefaced by an introduction which indicates the scope of the various parts of the yearbook, general remarks on the data contained therein, and recapitulatory tables based on such data.

MALAYAN AGRICULTURAL EXPORTS, JUNE, 1937.

PRODUCT.	Net Exports in Tons				
	Year 1936	Jan.-June 1936	Jan.-June 1937	June 1936	June 1937
Arecanuts ...	26,548	14,954	16,836	2,726	3,502
Coconuts fresh † ...	114,314†	56,566†	42,418†	11,952†	9,439†
Coconut oil ...	46,507	22,733	18,020	4,186	3,467
Copra ...	76,681	31,791	27,573	5,243	5,263
Gambier, all kinds ...	2,188	1,095	989	198	139
Copra cake § ...	20,438§	9,680§	6,095§	2,123§	285§
Palm kernels ...	4,964	1,987	2,768	325	238
Palm oil ...	29,296	11,525	20,614	2,861	4,325
Pineapples canned ...	76,403	46,205	46,728	14,037	10,296
Rubber ¶ ...	365,005¶	168,094¶	230,741¶	29,457¶	51,569¶
Sago,—flour ...	6,180	2,447	8,297	635*	144*
,, —pearl ...	3,319	1,634	1,471	266	132
,, —raw ...	7,484*	3,931*	3,885*	341*	787*
Tapioca,—flake ...	1,535	894	594	74	99
,, —flour ...	2,418*	982*	855*	149*	27
,, —pearl ...	17,797	7,928	8,461	1,844	1,367
Tuba root ...	599	358	324	50	62

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1937	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January ...	1,984.8	865.0	360.4	156.0
February ...	1,759.6	1,851.8	323.6	308.7
March ...	1,798.4	1,473.4	358.7	256.1
April ...	1,573.1	1,237.2	308.0	226.0
May ...	1,587.6	1,285.2	257.8	186.4
June ...	1,671.8	1,611.7	288.9	252.5
Total ...	10,375.3	8,324.3	1,897.4	1,385.7
Total January to June, 1936 ...	9,119.8	2,983.3	1,539.3	475.3
Total for the year 1936 ...	23,081.2	8,812.3	3,791.0	1,340.7

Stocks on estates at the 30th June, 1937 were: palm oil 1,698.3 tons; palm kernels 674.7 tons.

ACREAGES OF TAPPABLE RUBBER ACTUALLY TAPPED AND NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH JUNE, 1937.

STATE OR TERRITORY	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	ACREAGES OF TAPPABLE RUBBER NOT TAPPED				AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total area not tapped (5) + (7)	Percentage of (11) to (2)
				ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)					
				Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)	Acreage	Percentage of (9) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
STRAITS SETTLEMENTS :—											
Province Wellesley ...	43,645	26,205	60.0	210	0.5	17,230	39.5	356	0.8	17,440	40.0
Malacca ...	119,417	80,578	67.5	512	0.4	38,327	32.1	2,898	2.4	38,839	32.5
Penang Island ...	2,722	1,809	66.5	128	4.7	785	28.8	106	3.9	913	33.5
Singapore Island ...	32,951	22,248	67.5	1,000	3.0	9,703	29.5	119	0.4	10,703	32.5
Total S.S. ...	198,735	130,840	65.8	1,850	0.9	66,045	33.3	3,479	1.8	67,895	34.2
FEDERATED MALAY STATES :—											
Perak ...	291,961	217,215	74.4	1,196	0.4	73,550	25.2	9,078	3.1	74,746	25.6
Selangor ...	335,094	248,377	74.1	4,093	1.2	82,624	24.7	12,515	3.7	86,717	25.9
Negri Sembilan ...	264,153	187,524	71.0	3,802	1.4	72,827	27.6	11,268	4.3	76,629	29.0
Pahang ...	84,305	56,990	67.6	5,368	6.4	21,947	26.0	12,365	14.7	27,315	32.4
Total F.M.S. ...	975,513	710,106	72.8	14,459	1.5	250,948	25.7	45,226	4.6	265,407	27.2
UNFEDERATED MALAY STATES :—											
Johore ...	465,528	339,762	73.0	6,538	1.4	119,228	25.6	39,485	8.5	125,766	27.0
Kedah ...	170,931	134,058	78.4	11,411	6.7	25,462	14.9	13,719	8.0	36,873	21.6
Kelantan ...	28,185	21,754	77.2	403	1.4	6,028	21.4	3,276	11.6	6,431	22.8
Trengganu (b) ...	4,817	3,035	63.0	nil	nil	1,782	37.0	100	2.1	1,782	37.0
Perlis (c) ...	1,330	531	39.9	474	35.7	325	24.4	120	9.0	799	60.1
Brunei ...	5,602	3,541	63.2	1,133	20.2	928	16.6	831	14.8	2,061	36.8
Total U.M.S. ...	676,393	502,681	74.3	19,959	3.0	153,753	22.7	57,531	8.5	173,712	25.7
Total Malaya ...	1,850,641	1,343,627	72.6	36,268	2.0	470,746	25.4	106,236	5.7	507,014	27.4

Notes :—(a) Area out of tapping on estates which have partly ceased tapping refers to areas definitely being rested and includes areas rested under rotational systems, but excludes areas on any tapping round in respect of Perlis only.
(b) Registered companies only.
(c) Rendered quarterly.

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF JUNE, 1937, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		Jan. to June 1937		during the month		Jan. to June 1937						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to June 1937	during the month	Jan. to June 1937	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to June 1937
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	7,791	14,225	14,546	77,094	11,592	*39,739	Nil	Nil	Nil	Nil	13,598	7,615	80,127	‡27,931	...	11,838	14,088	15	99
Johore ...	...	2,284	5,261	6,303	33,193	6,287	*24,123	Nil	103	Nil	†2,176	3,617	7,399	18,640	38,496	...	4,236	4,986	...	...
Kedah ...	...	729	3,426	3,420	18,565	1,980	7,346	Nil	Nil	Nil	Nil	2,007	3,208	12,220	13,269	...	972	3,368	...	...
Perlis ...	...	14	17	14	78	45	141	Nil	Nil	Nil	Nil	Nil	52	Nil	203	...	28	10	...	...
Kelantan ...	...	673	340	397	2,123	1,536	4,942	Nil	Nil	Nil	Nil	288	1,048	1,698	4,241	...	1,293	317	...	...
Trengganu ...	...	55	50	400	1,643	200	822	Nil	Nil	Nil	Nil	Nil	600	Nil	2,465	...	55	50	...	...
Brunei ...	...	13	62	56	342	111	504	...	...	...	...	...	181	...	831	...	1	60	...	...
Total Malay States	...	11,559	23,381	25,136	133,038	21,751	*77,617	Nil	103	Nil	*2,176	19,510	20,103	112,685	*87,436	...	19,423	22,879	15	99
S. SETTLEMENTS :—																				
Malacca ...	...	1,930	1,236	1,445	7,938	1,168	4,435	Nil		Nil		2,844		17,323		...	2,218	1,086	...	...
Province Wellesley ...	...	1,195	662	545	3,076	612	1,689	Nil		Nil		7,331		45,811		...	1,973	725	...	...
Penang ...	931	4,757	23	23	99	265	761	2,827	17,830	18,675	85,552		Nil		Nil	3,116	5,571	11	...	...
Singapore ...	4,621	23,925	232	199	1,006	387	965	20,751		89,732		25,124		128,057		5,156	31,242	187	27	182
Labuan ...	...	35	Nil	Nil	Nil	38	117	36		276		Nil		Nil		...	43	Nil	...	...
Total Straits Settlements ...	5,552	31,842	2,153	2,212	12,119	2,470	7,967	23,614	17,830	108,683	85,552	35,299	Nil	191,191	Nil	8,272	41,047	2,009	27	182
Total Malaya ...	5,552	43,401	25,534	27,348	145,157	24,221	*85,584	23,614	17,933	108,683	*87,728	54,809	20,103	303,876	*87,436	8,272	60,470	24,888	42	281

*Figures amended.

†Kelantan rubber exported to Johore previously unrecorded:—

January	483 tons
February	509 ,,
March	307 ,,
April	100
May	22

‡The following amounts over reported:—

January	387 tons
February	317 ,,
March	93 ,,
April	218 ,,

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province Wel'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	10,659	29,731	5,260	3,995	3,198	369
WET RUBBER	2,179	1,511	311	240	1,038	603
TOTAL ...	12,838	31,242	5,571	4,235	4,236	972

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to June 1937
29	30	31
Singapore ...	38,600	201,555
Penang ...	11,357	70,182
Port Swettenham.	4,581	30,817
Malacca ...	271	1,322
MALAYA ...	54,809	303,876

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to June 1937
32	33	34
Malay States ...	39,463	197,948
Straits Settlements	4,071	12,123
MALAYA ...	43,534	217,971

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication, therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 23rd

METEOROLOGICAL SUMMARY, MALAYA, JUNE, 1937.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	91.1	72.8	81.9	95	70	86	75	85.1	85.6	1.53	38.9	0.56	7	6		1		202.35	6.75	55
Bukit Jeram, Selangor ...	90.2	73.6	81.9	92	71	88	77	87.4	87.7	0.41	10.4	0.32	3	2				226.45	7.55	61
Sitiawan, Perak ...	90.5	74.6	82.5	93	72	86	77	85.3	85.4	1.10	27.9	0.82	6	3	1			205.55	6.85	56
Temerloh, Pahang ...	90.5	73.1	81.8	93	70	84	76	86.7	86.8	3.62	92.7	1.06	7	7	5	5		192.45	6.41	52
Kuala Lipis, Pahang ...	89.4	72.0	80.7	92	69	82	75	85.1	85.7	3.57	90.7	1.02	13	11	1	21	2	164.50	5.48	45
Kuala Pahang, Pahang ...	87.9	74.8	81.3	91	72	82	77	88.0	88.1	3.95	100.3	2.79	10	5				201.45	6.71	55
Kallang Aerodrome, S'pore ...	86.8	77.8	82.3	89	73	83	83	83.7	84.3	4.88	124.0	1.55	12	9	3			192.10	6.40	52
Butterworth, Province Wellesley ...	88.9	75.2	82.1	91	71	81	78	86.5	86.6	6.24	158.5	1.99	12	9			2	197.35	6.58	53
Bayan Lepas Aerodrome Penang ...	88.6	75.4	82.0	92	72	79	80	85.7	85.7	4.75	120.7	2.57	10	7	3		1	196.65	6.55	53
Bukit China, Malacca ...	86.4	74.0	80.2	88	70	84	77	84.5	85.3	3.93	99.8	1.76	12	10	3		4	204.05	6.80	55
Kluang, Johore ...	88.5	71.7	80.1	93	68	81	75	82.4	83.4	6.37	161.8	3.34	14	10	5	1	1	162.60	5.42	44
Bukit Lalang, Mersing, Johore	87.9	72.2	80.1	91	69	81	77	83.0	82.7	4.98	126.5	1.20	15	13	2	1	3	201.65	6.72	55
Alor Star, Kedah ...	89.1	74.6	81.9	92	70	79	78	86.3	87.0	3.42	86.9	0.62	14	11			1	196.40	6.55	52
Kota Bahru, Kelantan ...	89.3	74.1	81.7	92	71	83	77	85.6	85.9	4.74	120.4	2.09	13	10	3			197.35	6.58	53
Kuala Trengganu, Trengganu HILL STATIONS.	88.4	73.6	81.0	92	71	80	76	84.0	85.4	2.75	69.9	0.80	12	8	4		1	197.80	6.59	53
Fraser's Hill, Pahang 4268 ft.	75.8	63.6	69.7	80	60	67	66	73.5	73.2	5.37	136.4	1.68	12	10		15	1	167.55	5.59	45
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	74.4	57.2	65.8	78	53	68	62	71.4	70.9	2.88	73.2	0.56	16	13				138.75	4.63	37
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	73.4	60.9	67.1	77	58	66	69			3.26	82.8	0.50	15	14				147.80	4.93	40

Compiled from Returns supplied by the Meteorological Branch, Malaya.